

The Centre for Alternative Technology and the legacy of E.F.Schumacher

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The pioneers of what was then the ‘National Centre for Alternative Technology’ moved onto its unpromising site in an abandoned slate Quarry in mid-Wales in 1974. I was not one of them, but I had a modest influence on its early days through my writings and occasional visits, and because I had first proposed the term ‘alternative technology’. The concept owed much to Schumacher, whose work I first discovered through his famous essay on Buddhist Economics, published in *Resurgence* in 1968.

Schumacher’s original conception of Intermediate Technology was aimed at developing countries. Schumacher observed how disruptive in a traditional culture were attempts to forcibly introduce advanced technological systems, and how inefficient they were in improving the lives of most of the people. Instead, he argued for technologies *intermediate* in scale and complexity between traditional hand tools and advanced industrial systems. He was talking about bicycles, ambient energy systems, improved latrines, ferrocement rainwater tanks, incremental improvements of vernacular building methods, new methods of food processing, and so on. He also recognised that systems of decentralised social ‘software’ were necessary, such as credit unions, methods of managing shared resources, and accessible forms of information diffusion. Once the whole of a local community had moved up to this new level of productivity, they would be ready to consider further developments. The emphasis was on maintaining the skills, solidarity, cultural heritage and ‘social capital’ of a community.

This approach was radically different from the economic orthodoxies of both capitalist west and communist east, each of whom regarded technological advance with almost religious reverence, as being more or less *the definition* of progress. In the context of developing countries it was assumed that the more ‘advanced’ the technology provided, the quicker development would occur. This view was enthusiastically adopted by the educated elites of the developing world, who regarded conspicuous items of high-tech equipment as important status symbols for themselves and their nations. Schumacher’s ideas did not sit happily in the normal arenas of political debate (“recipe for starvation” snorted one Marxist economist whose opinion I sought). But in subsequent years development theorists and agencies have come to appreciate that to avoid the social destructiveness of mass urban-industrial development, technology transfer should be matched to, or *appropriate to*, its social and economic context. This gave rise to the commonly-used synonym ‘Appropriate Technology’.

Theorists of appropriate/intermediate technology generally thought of it as a humane stepping-stone on the inevitable path to full modernisation. A minority, however, came to think of it as *an end in itself*, representing a sustainable decentralised model with traditional and modern features in an optimum combination. The philosophy of Gandhi was influential here, and the idea attracted dissident theorists in the developed world, often drawing on a Western tradition of critics such as Tolstoy, Morris,

Thoreau and Ruskin (who had himself influenced Gandhi). Could the principles of Intermediate/Appropriate Technology be applied also in the *developed world*?

Certain modern writers such as Lewis Mumford, Ivan Illich, Edward Goldsmith, and to some extent Schumacher himself, argued that industrial culture had gone down a mistaken path, and was unable to deliver true fulfilment to its members. It was in fact *over-developed*. This line of thought implied a revolutionary vision, of a vast global convergence in which poor traditional societies moved ‘upwards’ into the ‘intermediate’ state for economic reasons while rich but mal-developed societies would move ‘downwards’ into the intermediate state for cultural reasons.

Perhaps by chance, Schumacher was writing in a period when the modern awareness of environmental questions was in its formative stages. At that time it was hard to know whether observed and prospective physical environmental problems could be solved, even in principle. Some theorists suspected that there might be a fundamental contradiction between industrial culture and the integrity of the biosphere. The logic of this view suggested that the only path to long-term survival lay in a comprehensive *de-industrialisation* of modern societies. So the older *cultural* critique of industrial society was joined by a new *physical* critique, and these two strands of thought became entwined.

This is where ‘alternative technology’ came in: the technical basis for reforming and then maintaining over-developed societies in a way that is both physically and culturally optimal, or as we would now say, ‘sustainable’. Since the terms ‘intermediate’ and ‘appropriate’ technology were associated with strategies for developing countries, some other expression was sought, with a distinctive and intentionally provocative flavour. That vague but resonant key-word of those times, ‘alternative’ was pressed into service. Perhaps today ‘alternative technology’ reads oddly, but we’re stuck with it now, and of course over the years the meaning has evolved.

By the time I joined CAT in 1983 the organisation was well-established with a staff of about 30, half of whom, myself included, lived on the site. Part of CAT’s original mission was to develop a self-reliant community that could provide a kind of ‘ark’ for technical knowledge and skills in the event of a widespread social breakdown. We have to remember that in the radical and environmental circles of those days apocalyptic thinking was quite common, and some kind of ‘collapse’ was widely expected, perhaps through nuclear war, or the Marxian revolution, or ecological implosion. This did call for a different kind of technology, because after a social and economic collapse you would have to rely on materials and components you could make yourself, or through scavenging spare parts. There would be a strong emphasis on simple, low-tech methods. This provided a direct link to Schumacher’s conception of intermediate technology, aimed at resilience against failures in the supply chain in countries with a weak infrastructure. Indeed, there were so many parallels with what we were doing and the work of the Intermediate Technology Development Group (founded by Schumacher) that we regularly ran courses jointly with the ITDG and trained VSO volunteers.

The fondness for ‘string and sealing-wax’ methods created an enduring brand-image, and CAT is still seen as the fount of funky, small-scale improvisatory technology.

‘Small is Beautiful’ was a slogan that the early CAT could flaunt without contradiction.

All this started to change in the 80s. The revolution/apocalypse stubbornly refused to happen. If anything—perhaps on account of the fading of the Cold War—societal stability was taken for granted, while environmental concerns were going *down* the agenda. Perhaps we were all getting older, but gradually the romantic vision of a cuddly low-tech communitarian world appeared less and less relevant, and we realised that to have any influence at all we had to engage with the complex high-tech modern economy of large networked systems. We also came to think that some kind of modernity was the only sustainable future for everybody. It was unthinkable that in (say) 200 years the world would be divided into a rich super-technological minority and the rest still peasant farmers, and we did not think the developed world was going to ‘go back’ to its pre-industrial past. It simply couldn’t. We realised that the only way of negotiating a sustainable modernisation for all 9 billion eventual inhabitants of the planet was through sophisticated environmental technology, and not always ‘small’. In this respect we took a different view from practitioners such as Helena Norberg-Hodge or Vandana Shiva, and it is not entirely clear where Schumacher would have stood on these questions, had he lived. Where his vision clearly lived on at CAT was in the emphasis on the social and ethical component, and sense of due proportion—that new technologies were there to provide for reasonable aspirations, not grant a licence for an explosion of heedless growth.

What follows is a rough catalogue of what we’ve done at CAT in the last three decades. I have divided it into four categories, each of which demonstrates in some way the spirit of Schumacher’s legacy.

THE TECHNOLOGY

Renewable energy is CAT’s calling card. They are mostly benign and hard to abuse. Their intrinsic limits tend to keep things in proportion. Nobody could corner the market in solar or wind energy as they might in oil or uranium. At CAT we have made use of all the ambient resources available to us: sun, wind, water, ground heat, and biomass for both heating and electricity. Electricity was always more glamorous than heat. When I first came the whole site ran on just a few kilowatts, and was wholly independent of the grid. This required clever juggling on the part of our engineers, and draconian load-control. In 1990, after much argument, it was decided that grid-linking was the right thing to do because it allowed small generators to contribute efficiently and use the grid as a kind of battery. It also allowed us something approaching a ‘normal’ kind of supply. We have come to the view that the future should be an all-renewable grid-based system including imports and exports to and from Europe, with millions of feed-in generators large and small.

The electricity system at CAT has evolved steadily (although the supply has often struggled to keep up with the growth of demand as the organisation has expanded). 2008 sees the installation of a combined heat and power plant using local wood chips as the main source of energy. This will give us about 100kW of electricity, much of which will go to the grid, and up to 300kW of heat to be distributed to all buildings via a heat main. In addition we will have 7kW of water power and up to 20kW of solar. This might sound a lot, but we will do a lot with it, and we expect to be net exporters of electricity.

For all that energy is CAT's most famous activity, its experimentation with buildings is probably more successful and important. A typical modern building uses 80-90% high-carbon industrial products with 'garnishes' of traditional materials. At CAT we aim to reverse this ratio, with 80% or so of materials such as wood, earth, straw, slate, stone, paper, wool, and lime only 10-20% of 'industrial vitamins' (mostly membranes, adhesives, fixings—and glass, of course) that disproportionately improve performance. Schumacher would have liked this: he was not a Luddite; he was not against modern materials if in modest quantities they could make a big difference.

Of course the buildings are also designed to use very little energy in operation; and to be healthy, well-lit and flexible in use. Our most recent project, the £7 million Wales Institute for Sustainable Education (WISE) complex, is trying to be the greenest building in Wales, and is being monitored very carefully to be able to prove it. WISE uses rammed earth, timber frames, and a relatively new material, hemcrete, consisting of a mixture of hemp fibres and hydrated lime that is either used in blocks or sprayed onto walls to give excellent sound and heat insulation with a zero-carbon material.

Although we are no longer so impressed by the notion of 'self-sufficiency' as we were in the 70s, in many areas we have literally achieved it. Water for all purposes—hydropower, irrigation, washing, and drinking—is provided from a stream-fed reservoir above the site, inherited from the nineteenth-century slate workings. We clean drinking water by slow sand filters (a classic intermediate technology) and ultraviolet light (a good example of non-chemical treatment suitable for medium-scale supply). After use, the dirty water is all cleaned on the site with no energy or chemical inputs, just gravity, plumbing and plants. We have also created advanced designs for waterless toilets. Food wastes were originally processed by feeding them to pigs and poultry, a brilliant system for generating high-quality protein and useful manure. Sadly the current Animal By-Products Regulations no longer allow this, and we have to use a large proprietary machine that is in effect a mechanical pig, but with nothing you can eat and inferior 'manure'. Schumacher would have regarded this as a step backwards, and we heartily agree.

It is not so widely known that Schumacher was a luminary of the Soil Association and a strong supporter of sustainable farming. From the outset CAT adopted a kind of 'ultra-organic' approach with no agrochemicals at all, not even those permitted by the Soil Association. The result is that pest problems (apart from slugs of course!) have been negligible. We have also been able to demonstrate the immense potential of soils for sequestering carbon through the regular incorporation of organic material. An unexpected side-effect has been a far higher biological diversity than the surrounding farmland in spite of rapid development and intense human activity on the CAT site.

THE ORGANISATION

On the organisational side, CAT's structure has evolved gradually with the general aim of balancing efficiency and democracy. It is in effect a social enterprise owned by its permanent members, who also constitute the responsible management, overseen by a committee of local trustees. It is a model of how an organisation of any kind, be it a residential community, a campaigning body, or a business enterprise, can be self-governing and flourish by adapting to changing circumstances.

Most decisions are made by consensus, with provision for voting by secret ballot if absolutely necessary, although this is rarely invoked. Management is largely decentralised to individuals and departments, with an elected coordinating group whose members serve for eighteen months in rotation. Recently, after a very long period of debate and deliberation, we decided that this 'voluntary management' system would not be able to cope with the demands of a much larger organisation (now 150 and growing fast), and so we are phasing in a new tier of 'civil servants' between the elected committee and the departments.

The creation of this new 'class' of permanent managers might seem a departure from the cooperative spirit of the organisation, but they will not have any special privileges or rates of pay. CAT's wage differentials are very narrow, maximum 1:1.5, probably less than any other UK organisation of its size. There are three pay levels, and pay is equal within each level irrespective of the type of job, qualifications or length of service. These arrangements are reviewed from time to time, but have stood for many years. One imagines that Schumacher would have appreciated the evolution of a system that can cope with rapid growth and maintain the essential principles of self-management.

MAKING ENDS MEET

CAT has always tried to stand on its own feet, avoid dependence on outside support, and only grow at the rate that can be maintained by self-generated income. To achieve this we have tried to develop activities that simultaneously communicate our messages and generate money. We also try to exploit synergies between different activities to improve overall efficiency. Trying to get 'a quart out of a pint pot' by clever arrangements rather than technological main force is very much in the Schumacher tradition.

The most immediately visible aspects of CAT are the tourist/visitor demonstration facilities, with the usual car park, toilets, restaurant, shop, information points and so on. There are about 60,000 'drop-in' visitors a year. Most of these come in the summer, but the same facilities can be used for courses or training during the off-season.

The on-site shop is open all-year round, selling a bewilderingly large range of green books and products. It has a mail order branch that can be regarded as a kissing-cousin of the on-line Development Bookshop run by Practical Action Publishing, (formerly Intermediate Technology Publications, a branch of ITDG).

We also have our own publishing company, with 100 titles currently in print, ranging from one-page 'tipsheets' to full-colour textbooks. The knowledge that goes into these documents is the same knowledge used in teaching and displays, and in the information service.

There is a free information service, available to inquirers via post, phone, email, or in person. In recognition of its public value it is largely funded by grants, but also generates business for other departments. Where inquirers need more comprehensive information or guidance, we offer a paid consultancy service. The most common

requests are for help on eco-buildings, renewable energy, organic-waste and water treatment, and eco-tourism.

Research at CAT seems to happen in all directions, but if there are facts to discover or new systems to develop, we try to focus on problems of householders rather than commercial operations, choosing topics that need work but are being neglected by the big players, usually because there is no opportunity to make a fortune. Schumacher would have liked our low-tech, practical, interdisciplinary style of research, and the kinds of topics we pursue. Examples are simplified home-composting methods and improved containers; photovoltaics as part of a building's structure; testing the strength and thermal properties of composite building materials made from natural products; a comprehensive plan for 'decarbonising' the UK economy; using a mixture of grey-water and urine to simultaneously fertilise and irrigate crops, and clean the water. Research projects sometimes generate useful income through grants, and the knowledge gained feeds into our other work and publications.

CAT's fastest-growing sector at the moment is training and education. We started running courses for the general public in 1979, and now offer about 60 a year on everything you might expect and perhaps a few surprises. As well as 'Community Renewable Energy Systems', 'Gardening for a Sustainable Future', and 'Convert Your Engine to Vegetable Oil', there's 'Teaching Sustainable Development and Global Citizenship', the annual 'Sustainable Science Symposium' and 'Humanity and Nature: A Spiritual Exploration'. Schumacher would have relished this mixture.

In recent years the really explosive growth has been in Higher Education. We have always had visits from university groups, but early in the present decade one of the London universities suggested running a 'semi-distance-learning' MSc course in sustainable architecture at CAT, where the students would attend one week per month. This was immediately successful, and the numbers have virtually doubled each succeeding year, till we now have several hundred registered postgraduate students on what is now the largest masters course in the UK. The reasons for its popularity seem to be the unique combination of high-quality classroom teaching and hands-on practical work, in institution that 'walks its talk'. The WISE building, already mentioned, has been built to meet these new demands, but already it looks as if it will prove too small!

We have created a new department, the Graduate School of the Environment, and added a further MSc (in renewable energy) with others on the way. We already have several PhD students. CAT is steadily turning into something new: a kind of do-it-yourself micro-university. Schumacher would have loved it.

CAT AS A CATALYST FOR LOCAL REGENERATION

We have "spun off" several daughter companies, including Aber Instruments (located on the science park in Aberystwyth, making electronic equipment) and Dulas Engineering, which specialises in technology for developing countries, mostly remote energy systems. Numerous other enterprises and activities in the area almost certainly would not exist but for the historical presence of CAT and the new markets it has created. CAT was also instrumental in the setting up of Ecodyfi, the sustainable-development agency for the Dyfi Valley region. Ecodyfi has in turn stimulated all manner of new initiatives. This is perhaps the most striking example of the spirit of

Intermediate Technology: dozens of small enterprises and other organisations, mostly with environmental and social ‘products’. Although wages remain modest, and certainly nobody has made a fortune, hundreds of meaningful jobs have been created and the regeneration is far more strongly-rooted and ‘robust’ than typical development initiatives imposed from outside. Admittedly it has taken a long time to get to this point, but after thirty-five years, the reputation of the Dyfi Valley as the sustainable dynamo of Wales can be traced back to the small group of dedicated people who started CAT, and were proud to acknowledge the inspiration of E.F Schumacher.